

Grafting Magnolia on Liriodendron

By R.B. Figlar

Ever since becoming interested in magnolias about ten years ago, I've been fascinated with the taxonomic link between *Magnolia* and *Liriodendron*, both of which, of course, are members of *Magnoliaceae*. Here in the northern New Jersey-southeastern New York area, *Liriodendron tulipifera* is one of the more common indigenous trees, occurring in nearly all forest habitats.

When our house was built in 1980, the disturbed areas along the perimeter of our property became prime breeding grounds for *L. tulipifera* seedlings. Though tuliptree saplings can often be a nuisance in the garden, rather than removing them we decided to try grafting magnolias onto these young volunteer tuliptrees. If the close relationship between *Magnolia* and *Liriodendron* allows grafting between these two genera, our little *Liriodendron* "weeds" could become quite useful.

Cases of successful graft "takes" between different genera within a family are not commonplace. Trifoliolate orange (*Poncirus trifoliata*) has sometimes been used as an understock for commercially grown orange trees, while quince (*Cydonia oblonga*) has been used as an understock for pear and loquat (Hartmann & Kester, 1983). Even within *Magnoliaceae*, successful unions have been reported between *Magnolia* and *Michelia* (Savage, 1973) and between *Magnolia* and *Manglietia* (Chiappino 1975, shown on cover of AMS Newsletter, Vol. XI, No. 1.)

What about grafting between *Magnolia* and *Liriodendron*? Joe McDaniel back in the late 1970s indicated to me in a conversation that

"the union is not possible," though I don't recall anything more specific from our discussion. Literature searches by Peter Del Tredici (Arnold Arboretum), by Charles Tubering (University of British Columbia), by Lola Koerting (Brooklyn Botanic Garden), and by me failed to turn up anything. So with no reports of successes or failures of previous attempts, I began the experiment.

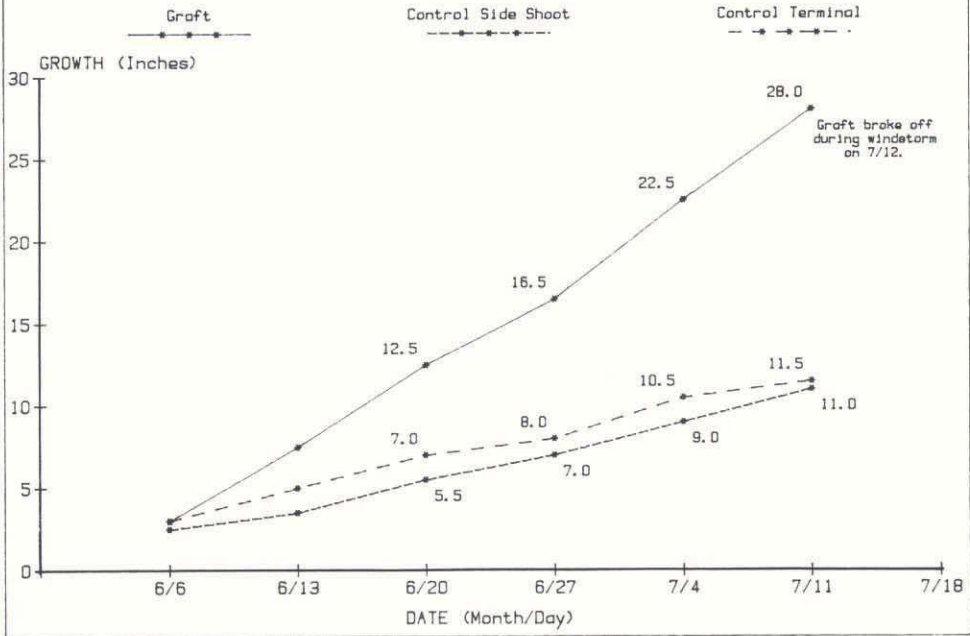
Magnolia acuminata was chosen as the first guinea pig for several reasons. The growth habit as well as the wood of the cucumbertree is considered similar to that of the tuliptree, at least by foresters (Collingwood & Brush, 1974). Moreover, on the basis of floral odors (Thien, Heimermann, & Holman, 1975) there is a high degree of correlation between the odor of *L. tulipifera* and *M. acuminata*. Thus, it was presumed that perhaps *M. acuminata* was more closely related to *L. tulipifera* than were other species of magnolia.

Using ordinary chipbud grafting methods (McDaniel, 1973), I grafted *M. acuminata* buds on various *L. tulipifera* saplings in our backyard in 1980, 1981, and 1982. Of the total of 10 chipbuds, all failed to take. During the same period "control" chipbuds of



M. tripetala graft on *Liriodendron*, bud now two inches long.

GROWTH OF *M. TRIPETALA* GRAFTED ON *L. TULIPIFERA*
vs GROWTH OF *M. TRIPETALA* ON ITS OWN ROOTS (Control Plant)



L. tulipifera on *L. tulipifera* and of *M. acuminata* on itself were successful more than 50 percent of the time. Thus, even though 10 was a small sample size, the three different years of trials and the results of the control grafts made a pretty good case for ruling out the potential for a successful union between the cucumbertree and the tuliptree.

I had just about given up, then, while inspecting the ripening wood of a 2-year-old *M. fraseri* in our backyard, I was intrigued by the striking resemblance of the wood of *M. fraseri* to the stems of *L. tulipifera*. Why not try this Magnolia on Liriodendron? Instead of butchering my small *M. fraseri* for budwood, I decided to take scions of *M. tripetala*, since it and *M. fraseri* are considered closely allied in section *Rytidospermum*.

In early September 1983 I grafted three *M. tripetala* buds: one well developed (hook shaped) 1/2-inch bud, and two of the usual small dormant buds. The well developed bud was topworked five feet up the central

leader of a 7-foot *L. tulipifera* sapling, while the two dormant buds were grafted on the lower auxiliary branches — one on the same tuliptree and the other on a second sapling. The buds seemed to heal nicely and looked good through the rest of the fall and winter. Despite these good signs, I wasn't really very optimistic yet.

Spring of 1984 came late and trees in our area didn't begin to break bud until late April. Some magnolias, including our permanent plant of *M. tripetala* (the scion donor), began to leaf out by the fourth week of that month. The experimental grafts had not. Though the buds still looked healthy, I still wasn't really expecting anything to happen.

After coming home from work, while taking my usual walk through the yard (April 29), I was excited to see that one of the experimental buds was beginning to show new growth! By the next day all three buds showed evidence of growing out. Within a few weeks the topworked bud really began to take off. By June 6 it had grown 3 inches

and showed 6 leaves (nodes). By comparison, the control plant (scion donor) of *M. tripetala*, which had an earlier start, had also grown three inches but with 9 leaves on its terminal shoot. In contrast to the performance of the topworked bud, the two auxiliary set buds were still in the process of expanding and were no more than 3/4-inch long. I soon lost interest in these two buds and neglected them thereafter.

During June the graft began to grow quite vigorously. Except for my occasional trimming back of Liriodendron growth from other branches on the stock, the *M. tripetala* graft was left to proceed on its own — no fertilizer and no staking or splinting of the graft to the stock for additional support. The union healed nicely with abundant callusing (see closeup photo).

During the latter part of June one side of the callus mass developed a small brown line (necrotic layer). Some sap appeared to be leaking from the area a few days later. Fortunately the problem didn't get any worse and in fact the necrotic line seemed to heal over after a week or two.

By early July it became evident that the callus tissue was continuing to accumulate at the point of union between the *M. tripetala* scion and the tuliptree stock. Usually by this time the callus bridge should begin to differentiate into new xylem and phloem tissues. These would then provide a normal vascular connection between scion and stock (Hartman & Kester, 1983). Apparently, though, this had no adverse effect whatever on the growth rate of the graft, which was now putting on five inches of new terminal growth a week. (see graph).

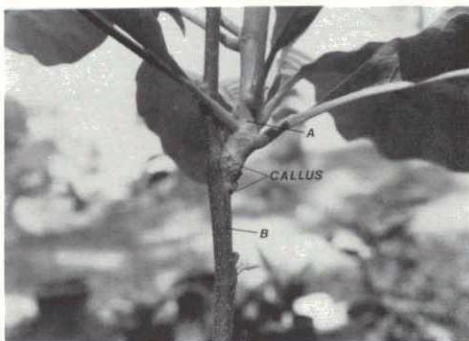
Then fate stepped in, and during the late evening of July 11 a cold front moved through the area, accompanied by winds of 20 to 25 miles per hour. The next morning the graft was found lying on the ground, having been blown down by the strong winds. The break was more or less clean at the point of union. Some *M. tripetala*

wood did remain on the Liriodendron stock but there were no buds on it.

Analysis. Despite the excessive callus accumulation, the small necrotic fissure, and the nearly clean break at the union, the growth performance of the graft of *M. tripetala* on *L. tulipifera* was astonishing:

- The graft grew a total of 28 inches. This was two times more than any magnolia in our yard and almost three times more than the growth of the control plant of *M. tripetala*.
- During the five weeks ending July 11 the graft grew at the rate of five inches per week. This compares to 1.7 inches per week for the control plant.
- The graft put out an average of 1.7 new nodes per week during the same five-week period, compared to only 1.0 per week for the control plant.
- The leaves on the graft were larger (up to 19 inches long) and of a darker green than those on the control plant.
- The graft shoot developed seven auxiliary branches ranging from 1 inch to 7.5 inches long. The control plant developed only two auxiliary branches.
- Though it grew for only ten weeks, the weight of the graft after it blew down was 1 pound.

Conclusion. This experiment with grafting Magnolia on Liriodendron does prove that an initial union between the two genera is at least possible. The evidence (as shown by



Closeup view of *M. tripetala* (A) grafted onto *Liriodendron tulipifera* (B). Note extensive callus buildup at graft union. Diameter of stock at B: 1/2 inch.